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PREDICTION OF LONGITUDINAL AND SUBSIDENCE PROFILES WITH WIDTH/DEPTH RATIOS IN EXCESS OF 3.0 USING NATIONAL COAL BOARD METHODS

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MICROMEDIA

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PREDICTION OF LONGITUDINAL AND SUBSIDENCE PROFILES WITH WIDTH/DEPTH RATIOS IN EXCESS OF 3.0 USING NATIONAL COAL BOARD METHODS

by

T.R.C. Aston*

SUMMARY

The National Coal Board Subsidence Engineers' Handbook (NCB SEH) only allows generalised longitudinal and transverse subsidence profiles with width/depth (w/h) ratios of up to 3.0 to be calculated. Two programs have been developed at the Cape Breton Coal Research Laboratory (CBCRL) which allow the computer calculation of subsidence profiles using the NCB SEH method. However, the two programs allow theoretical subsidence profiles to be calculated for longwall mining panels with w/h ratios in the range 3.0 to 14.0. In addition, longitudinal subsidence profiles are calculated for panels with depths varying between 10 m and 750 m.

The purpose of this report is to indicate to researchers who use the CBCRL NCB SEH prediction programs: 1) how the w/h ratios in the range 3.0 to 14.0 were derived and 2) where the predictive methods for the longitudinal profiles originated.

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PRÉDICTION DES PROFILES DE LA SUBSIDENCE LONGITUDINALE ET TRANSVERSALE AYANT DES RAPPORTS LARGEUR/PROFONDEUR AU-DESSUS DE 3,0 À L'AIDE DES MÉTHODES DU NATIONAL COAL BOARD

par

T.R.C. Aston *

RÉSUMÉ

Seul le calcul des profiles de la subsidence longitudinale et transversale, ayant des rapports largeur/profondeur s'élevant jusqu'à 3,0, peut être effectué à l'aide du manuel "Subsidence Engineers Handbook" (SEH) du National Coal Board (NCB). Au Laboratoire de recherche sur le charbon du Cap-Breton (LRCCB), on a mis au point deux programmes qui permettent de calculer, à l'aide d'un ordinateur, les profiles de la subsidence suivant la méthode décrite dans le manuel du NCB. Toutefois, ces deux programmes permettent à l'utilisateur d'effectuer le calcul des profiles théoriques de la subsidence des panneaux exploités par longue taille, ayant des rapports largeur/profondeur dans la gamme de 3,0 à 14,0. En outre, les profiles de la subsidence longitudinale sont calculés pour les panneaux dont la profondeur varie entre 10 et 750 m.

Le présent rapport a pour but d'indiquer les points suivants aux chercheurs qui utilisent les programmes de prédiction du LRCCB et du NCB: 1) comment on en est arrivé à dériver les rapports largeur/profondeur dans la gamme de 3,0 à 14,0 et 2) d'où proviennent les méthodes de prédiction pour calculer les profiles longitudinaux.

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INTRODUCTION

The National Coal Board (NCB) Subsidence Engineers' Handbook (SEH) (1) only allows subsidence profiles to be calculated for longwall mining panels with width/depth (w/h) ratios of less than 3.0. However, it is often necessary to calculate theoretical profiles for horizons located within the intervening strata, for which the w/h ratio is greater than 3.0 (2,3).

Two programs have been developed at the Cape Breton Coal Research Laboratory (CBCRL) which allow the computer calculation of subsidence profiles using the NCB SFH method (4,5). These programs allow theoretical subsidence profiles to be calculated for longwall mining panels with w/h ratios in the range 3.0 to 14.0. In addition, longitudinal subsidence profiles are also calculated for panels with depths varying between 10 m and 750 m. A detailed discussion of the prediction of longitudinal subsidence profiles is not given in the NCB SEH.

The purpose of this report is to indicate to future researchers who use the CBCRL NCB SEH prediction programs (4,5): 1) how the w/h ratios in the range 3.0 to 14.0 were derived and 2) where the predictive methods for the longitudinal profiles originated.

MAXIMUM SUBSIDENCE

Using the NCB SEH, maximum subsidence is calculated by multiplying the extracted seam height by an s/m factor which is derived from the width and depth values of the mining panel or working under consideration. Figure 1 shows the relationship of subsidence to width and depth and reveals that s/m factors can be readily derived for workings with width and depth values as low as 50 m.

Below 50 m, photo enlargement of Figure 1 and extrapolation of the s/m curves through zero allows s/m factors to be obtained for panels with widths and/or depths as low as 10 m.

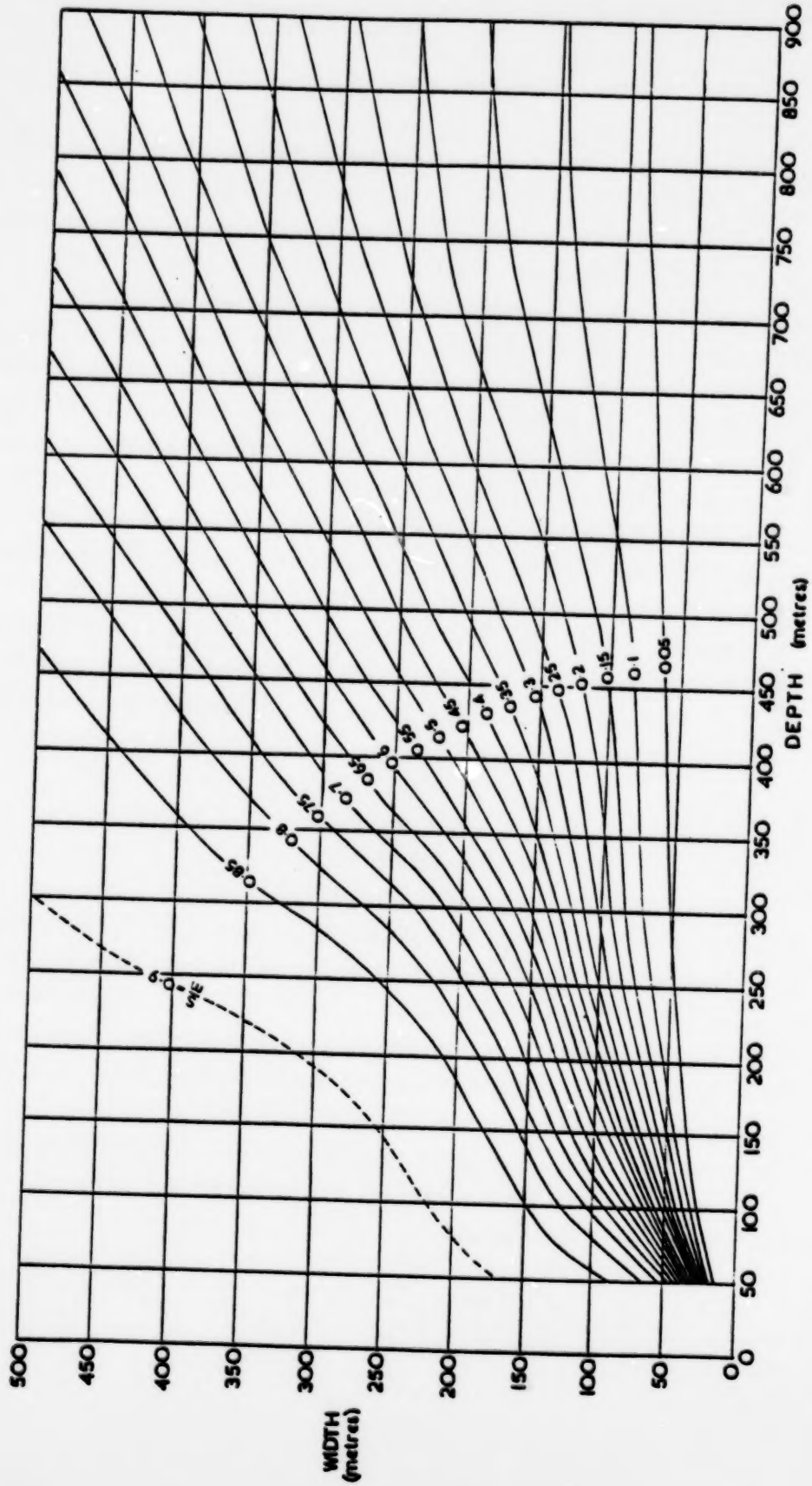

Figure 1 - Relationship between subsidence and the width and depth of a working panel (1)

DISTANCE OF SUBSIDENCE PROFILE POINTS (s/S)

TRANSVERSE PROFILE

The NCB SEH graph for predicting the location of s/S subsidence points is given in Figure 2, while the tabulated values of distance from the face centerline in terms of depth are given in Table 1.

Above a w/h ratio of 2.6, it was assumed that all the subsidence contours (Figure 2) continue as straight lines and exhibit a linear relationship of the form $y = mx + c$. Values for w/h ratios between 2.6 and 14.0 were obtained using a Trend Line Analysis program available on a Texas TI-51-III calculator (2). Quality control checks were undertaken on the derived points using a correlation program and each contour was only accepted when the correlation coefficient exceeded 0.98.

The tabulated s/S values for w/h ratios from 2.6 to 14.0 can be found elsewhere (4,5).

LONGITUDINAL PROFILE

The location of s/S subsidence points from the panel face line for the longitudinal profile were calculated from Figure 3, which was obtained from the NCB East Midlands Subsidence Unit (6).

Each of the s/S contours on Figure 3 was digitised and the tabulated values can be found elsewhere (4,5).

MAXIMUM TENSILE AND COMPRESSIVE STRAIN

Maximum tensile and compressive strain values are calculated by dividing maximum subsidence by the working seam depth and multiplying the answer by a parametric factor which is obtained from Figure 4 (1). Beyond a w/h ratio of 1.4, it is assumed that both the tensile and compressive curves continue as straight lines. Selected tensile and compressive strain multiplying factors for w/h ratios between 0.2 and 5.0 are given in Table 2.

Tabulated tensile and compressive multiplier factors for w/h ratios up to 14.0 can be found elsewhere (4,5).

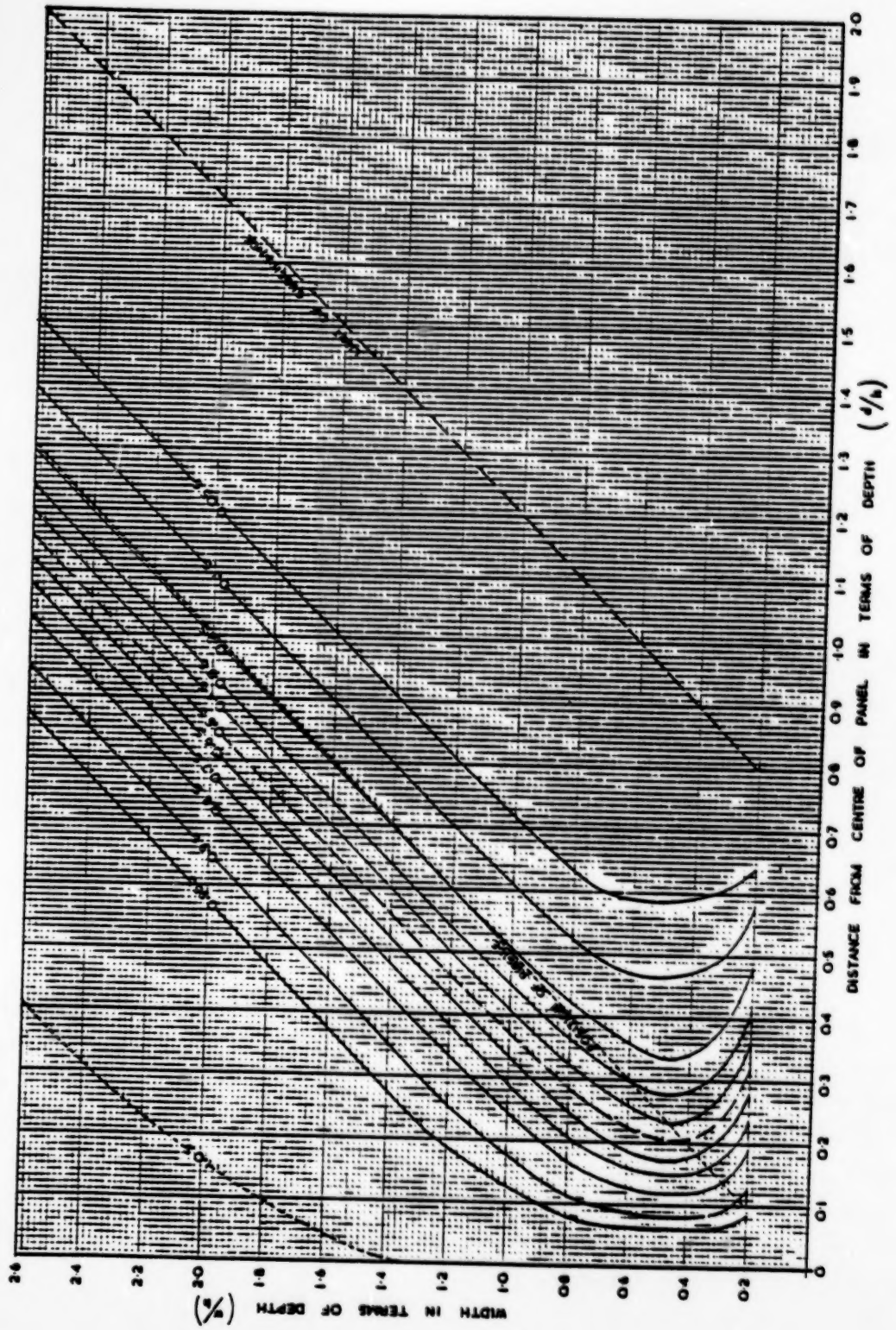

Figure 2 - Graph for the prediction of transverse subsidence profile contours (1)

Values of s/S	0	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	0.95	1.00
w/h RATIO OF PANEL	DISTANCES FROM PANEL CENTRE IN TERMS OF DEPTH												
2.6	2.00	1.51	1.39	1.29	1.24	1.19	1.16	1.12	1.08	1.03	0.95	0.87	0.41
2.4	1.90	1.41	1.29	1.19	1.14	1.10	1.06	1.02	0.98	0.93	0.85	0.77	0.31
2.2	1.80	1.31	1.19	1.09	1.04	1.00	0.96	0.92	0.88	0.83	0.75	0.67	0.23
2.0	1.70	1.21	1.09	0.99	0.94	0.90	0.86	0.82	0.78	0.73	0.65	0.57	0.16
1.8	1.60	1.11	1.00	0.90	0.84	0.80	0.76	0.72	0.68	0.63	0.55	0.47	0.10
1.6	1.50	1.01	0.90	0.80	0.74	0.70	0.66	0.62	0.58	0.53	0.45	0.37	0.06
1.4	1.40	0.91	0.80	0.70	0.64	0.60	0.56	0.52	0.48	0.43	0.35	0.27	0.01
1.3	1.35	0.86	0.75	0.65	0.59	0.55	0.51	0.47	0.43	0.38	0.30	0.23	0
1.2	1.30	0.81	0.70	0.60	0.54	0.50	0.46	0.42	0.38	0.33	0.25	0.19	0
1.1	1.25	0.77	0.65	0.55	0.50	0.45	0.42	0.38	0.34	0.29	0.21	0.16	0
1.00	1.20	0.72	0.61	0.51	0.45	0.41	0.37	0.33	0.29	0.24	0.18	0.13	0
0.98	1.19	0.71	0.60	0.50	0.44	0.40	0.36	0.33	0.28	0.24	0.17	0.12	0
0.96	1.18	0.70	0.59	0.49	0.43	0.39	0.35	0.32	0.27	0.23	0.16	0.11	0
0.94	1.17	0.69	0.58	0.48	0.42	0.38	0.34	0.31	0.26	0.22	0.16	0.11	0
0.92	1.16	0.68	0.57	0.47	0.41	0.37	0.33	0.30	0.26	0.21	0.15	0.10	0
0.90	1.15	0.68	0.57	0.46	0.40	0.36	0.32	0.29	0.25	0.20	0.14	0.10	0
0.88	1.14	0.67	0.56	0.45	0.40	0.36	0.32	0.28	0.24	0.20	0.13	0.10	0
0.86	1.13	0.66	0.55	0.45	0.39	0.35	0.31	0.27	0.23	0.19	0.13	0.09	0
0.84	1.12	0.65	0.54	0.44	0.38	0.34	0.30	0.26	0.22	0.18	0.12	0.09	0
0.82	1.11	0.64	0.53	0.43	0.37	0.33	0.29	0.26	0.21	0.17	0.12	0.08	0
0.80	1.10	0.63	0.52	0.42	0.36	0.32	0.28	0.25	0.21	0.17	0.11	0.08	0
0.78	1.09	0.63	0.52	0.42	0.36	0.32	0.28	0.24	0.20	0.16	0.11	0.08	0
0.76	1.08	0.62	0.51	0.41	0.35	0.31	0.27	0.23	0.20	0.16	0.11	0.07	0
0.74	1.07	0.61	0.50	0.40	0.34	0.30	0.26	0.23	0.19	0.15	0.10	0.07	0
0.72	1.06	0.61	0.50	0.39	0.34	0.30	0.26	0.22	0.18	0.15	0.10	0.07	0
0.70	1.05	0.60	0.49	0.39	0.33	0.29	0.25	0.21	0.18	0.14	0.10	0.07	0
0.68	1.04	0.60	0.49	0.38	0.32	0.28	0.24	0.21	0.17	0.14	0.10	0.07	0
0.66	1.03	0.60	0.48	0.38	0.32	0.28	0.24	0.20	0.17	0.14	0.09	0.06	0
0.64	1.02	0.59	0.48	0.37	0.31	0.27	0.23	0.20	0.17	0.13	0.09	0.06	0
0.62	1.01	0.59	0.47	0.37	0.31	0.27	0.23	0.19	0.16	0.13	0.09	0.06	0
0.60	1.00	0.59	0.47	0.36	0.30	0.26	0.22	0.19	0.16	0.13	0.09	0.06	0
0.58	0.99	0.59	0.47	0.35	0.30	0.25	0.22	0.18	0.16	0.13	0.09	0.06	0
0.56	0.98	0.59	0.47	0.35	0.29	0.25	0.21	0.18	0.15	0.12	0.08	0.06	0
0.54	0.97	0.59	0.47	0.34	0.29	0.25	0.21	0.18	0.15	0.12	0.08	0.06	0
0.52	0.96	0.59	0.47	0.34	0.28	0.24	0.21	0.17	0.15	0.12	0.08	0.06	0
0.50	0.95	0.59	0.47	0.34	0.28	0.24	0.21	0.17	0.15	0.12	0.08	0.06	0
0.48	0.94	0.59	0.47	0.33	0.28	0.23	0.20	0.17	0.15	0.12	0.08	0.06	0
0.46	0.93	0.59	0.47	0.33	0.28	0.23	0.20	0.17	0.15	0.12	0.08	0.06	0
0.44	0.92	0.59	0.47	0.33	0.28	0.23	0.20	0.17	0.15	0.12	0.08	0.06	0
0.42	0.91	0.59	0.47	0.34	0.28	0.24	0.20	0.17	0.15	0.12	0.08	0.06	0
0.40	0.90	0.59	0.47	0.34	0.28	0.24	0.21	0.18	0.15	0.12	0.08	0.06	0
0.38	0.89	0.60	0.48	0.35	0.29	0.24	0.21	0.18	0.15	0.12	0.08	0.06	0
0.36	0.88	0.60	0.48	0.35	0.29	0.25	0.21	0.18	0.15	0.12	0.08	0.06	0
0.34	0.87	0.60	0.49	0.36	0.30	0.25	0.22	0.19	0.16	0.12	0.08	0.06	0
0.32	0.86	0.60	0.49	0.37	0.31	0.26	0.22	0.20	0.16	0.13	0.09	0.06	0
0.30	0.85	0.61	0.50	0.38	0.32	0.27	0.23	0.20	0.17	0.13	0.09	0.06	0
0.28	0.84	0.61	0.51	0.39	0.33	0.28	0.24	0.21	0.18	0.14	0.09	0.07	0
0.26	0.83	0.62	0.52	0.41	0.35	0.30	0.26	0.22	0.19	0.15	0.10	0.07	0
0.24	0.82	0.62	0.53	0.43	0.36	0.32	0.28	0.24	0.20	0.16	0.11	0.07	0
0.22	0.81	0.63	0.55	0.46	0.39	0.34	0.30	0.26	0.21	0.17	0.11	0.08	0
0.20	0.80	0.64	0.57	0.48	0.41	0.37	0.32	0.28	0.23	0.19	0.13	0.08	0

Table 1 - Relationship between w/h ratio and the location of s/S points from panel centerline in terms of depth (1)

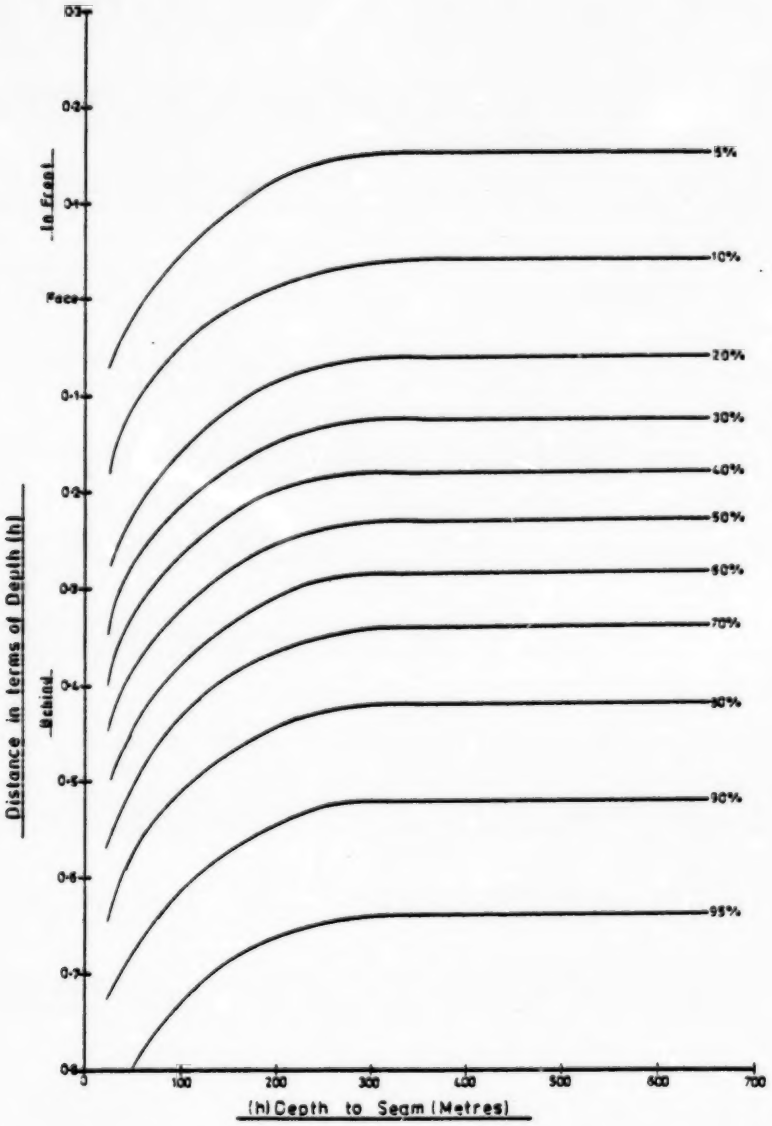

Figure 3 - Graph for the prediction of longitudinal subsidence contours (6)

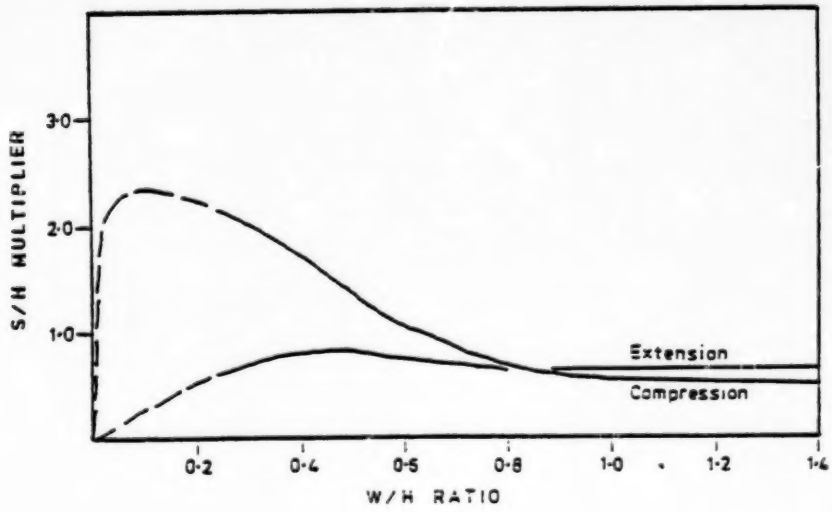

Figure 4 - NCB SEH s/h multiplier values for the prediction of maximum tensile and compressive strains (1)

W/H RATIO	TENSILE STRAIN	COMPRESSIVE STRAIN
0.2	0.55	2.25
0.4	0.80	1.70
0.6	0.80	1.05
0.8	0.65	0.70
1.0	0.65	0.55
1.2	0.65	0.50
1.4	0.65	0.50
1.6	0.65	0.50
1.8	0.65	0.50
2.0	0.65	0.50
3.0	0.65	0.50
4.0	0.65	0.50
5.0	0.65	0.50

Table 2 - NCB SEH s/h multiplier values for the prediction of maximum tensile and compressive strains (1)

DISTANCE OF STRAIN PROFILE POINTS (e/E)

TRANSVERSE PROFILE

The NCB SEH graph for predicting the location of e/E strain points is given in Figure 5, while the tabulated values of distance from the face centerline in terms of depth are given in Table 3.

Above a w/h ratio of 3.0, it was assumed that all the strain contours (Figure 5) continue as straight lines and exhibit a linear relationship of the form $y = mx + c$. Values for w/h ratios between 3.0 and 14.0 were obtained using a Trend Line Analysis program available on a Texas TI-51-III calculator (2). Quality control checks were undertaken on the derived points using a correlation program and each contour was only accepted when the correlation coefficient exceeded 0.98.

The tabulated values for w/h ratios from 3.0 to 14.0 can be found elsewhere (4,5).

LONGITUDINAL PROFILE

The location of e/E strain points from the panel face line for the longitudinal profile were calculated from Figure 6, which was obtained from the NCB East Midlands Subsidence Unit (6).

Each of the e/E contours on Figure 6 was digitised and the tabulated values can be found elsewhere (4,5).

DISCUSSION

The NCB SEH was developed from the analysis of an extensive data base of case histories collected from a variety of coalfields in the United Kingdom (1). However, it is difficult, especially when using empirical techniques, to quantify the effects of individual parameters such as geology or previous workings on the eventual profile magnitude. Problems can therefore arise when applying the NCB SEH to panels in coalfields which were either not included or only poorly represented in the original data base. The NCB SEH for all its limitations can give a good indication of the probable magnitude of subsidence profiles, providing that the conditions to which it is applied

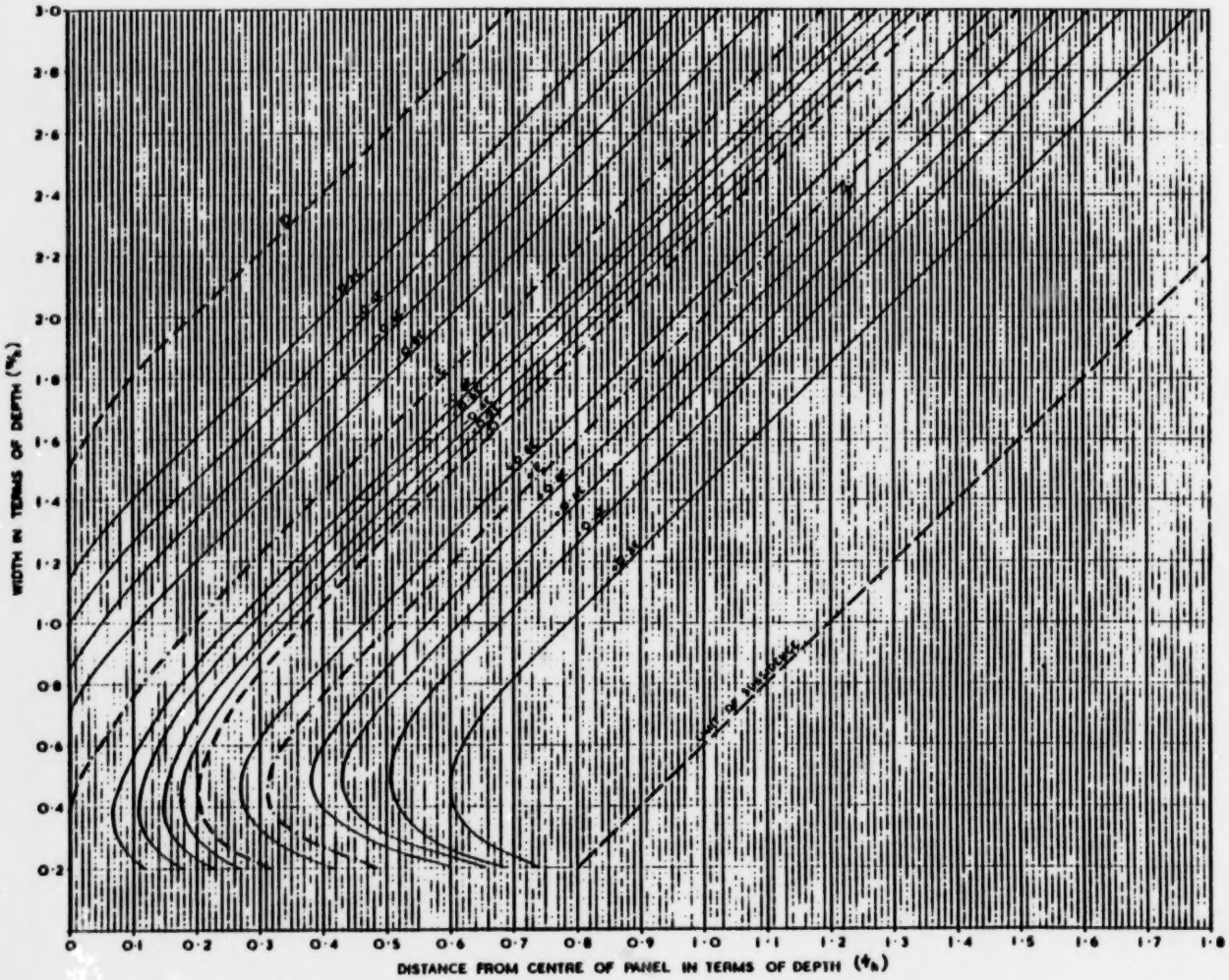

Figure 5 - Graph for the prediction of transverse strain profile contours (1)

Values of e/E	Extension (+E)							Compression (−E)										
	0	0.20	0.40	0.60	0.80	1.00	0.80	0	0.20	0.40	0.60	0.80	1.00	0.80	0.60	0.40	0.20	0
w/h RATIO OF PANEL	DISTANCES FROM PANEL CENTRE IN TERMS OF DEPTH																	
3.0	2.2	1.78	1.67	1.61	1.56	1.50	1.46	1.36	1.34	1.31	1.28	1.25	1.19	1.10	1.03	0.96	0.90	0.70
2.6	2.0	1.58	1.47	1.41	1.36	1.30	1.26	1.16	1.14	1.11	1.08	1.06	0.99	0.90	0.83	0.77	0.70	0.50
2.2	1.8	1.38	1.27	1.21	1.15	1.10	1.06	0.96	0.94	0.91	0.88	0.85	0.79	0.70	0.63	0.57	0.50	0.30
2.0	1.7	1.28	1.17	1.11	1.05	1.00	0.96	0.86	0.84	0.81	0.78	0.75	0.69	0.60	0.53	0.47	0.40	0.20
1.8	1.6	1.17	1.07	1.01	0.95	0.90	0.86	0.76	0.73	0.71	0.68	0.66	0.59	0.50	0.43	0.37	0.30	0.10
1.6	1.5	1.06	0.97	0.91	0.85	0.80	0.76	0.66	0.63	0.61	0.58	0.55	0.49	0.40	0.33	0.27	0.20	0.03
1.4	1.4	0.98	0.87	0.81	0.75	0.70	0.66	0.56	0.53	0.51	0.48	0.45	0.39	0.30	0.23	0.17	0.10	0
1.3	1.36	0.93	0.82	0.76	0.70	0.65	0.61	0.51	0.49	0.46	0.43	0.40	0.34	0.25	0.18	0.12	0.05	0
1.2	1.3	0.88	0.77	0.71	0.66	0.61	0.56	0.46	0.44	0.41	0.38	0.36	0.29	0.20	0.13	0.07	0.02	0
1.1	1.25	0.83	0.72	0.66	0.61	0.56	0.52	0.42	0.39	0.37	0.33	0.31	0.24	0.15	0.08	0.03	0	0
1.0	1.2	0.79	0.68	0.62	0.57	0.51	0.47	0.37	0.35	0.32	0.29	0.26	0.20	0.10	0.05	0	0	0
0.98	1.19	0.78	0.67	0.61	0.56	0.50	0.46	0.36	0.34	0.31	0.28	0.25	0.19	0.09	0.04	0	0	0
0.96	1.18	0.77	0.66	0.60	0.55	0.49	0.45	0.35	0.33	0.30	0.27	0.24	0.18	0.09	0.04	0	0	0
0.94	1.17	0.76	0.65	0.59	0.54	0.48	0.44	0.35	0.32	0.30	0.26	0.23	0.17	0.08	0.03	0	0	0
0.92	1.16	0.75	0.64	0.58	0.53	0.47	0.43	0.34	0.31	0.29	0.25	0.22	0.16	0.07	0.02	0	0	0
0.90	1.15	0.74	0.63	0.57	0.52	0.46	0.42	0.33	0.30	0.28	0.24	0.21	0.15	0.06	0.02	0	0	0
0.88	1.14	0.73	0.62	0.56	0.51	0.46	0.41	0.32	0.29	0.27	0.24	0.21	0.15	0.05	0.01	0	0	0
0.86	1.13	0.72	0.61	0.55	0.50	0.45	0.40	0.31	0.29	0.26	0.23	0.20	0.14	0.05	0	0	0	0
0.84	1.12	0.71	0.60	0.54	0.49	0.44	0.39	0.30	0.28	0.25	0.22	0.19	0.13	0.04	0	0	0	0
0.82	1.11	0.70	0.59	0.53	0.48	0.43	0.38	0.29	0.27	0.25	0.21	0.18	0.12	0.03	0	0	0	0
0.80	1.10	0.69	0.58	0.53	0.48	0.42	0.37	0.29	0.26	0.24	0.20	0.17	0.11	0.02	0	0	0	0
0.78	1.09	0.68	0.57	0.52	0.47	0.41	0.36	0.28	0.26	0.23	0.20	0.17	0.11	0.02	0	0	0	0
0.76	1.08	0.67	0.57	0.51	0.46	0.40	0.36	0.27	0.25	0.22	0.19	0.16	0.10	0.01	0	0	0	0
0.74	1.07	0.67	0.56	0.50	0.45	0.39	0.35	0.26	0.24	0.22	0.18	0.15	0.09	0.01	0	0	0	0
.072	1.06	0.66	0.55	0.49	0.44	0.38	0.34	0.26	0.24	0.21	0.17	0.15	0.09	0	0	0	0	0
0.70	1.05	0.65	0.54	0.48	0.44	0.37	0.33	0.25	0.23	0.20	0.17	0.14	0.08	0	0	0	0	0
0.68	1.04	0.64	0.54	0.47	0.43	0.37	0.32	0.24	0.22	0.20	0.16	0.13	0.07	0	0	0	0	0
0.66	1.03	0.64	0.53	0.47	0.42	0.36	0.31	0.24	0.22	0.19	0.16	0.13	0.07	0	0	0	0	0
0.64	1.02	0.63	0.53	0.46	0.41	0.35	0.31	0.23	0.21	0.19	0.15	0.12	0.06	0	0	0	0	0
0.62	1.01	0.63	0.52	0.45	0.41	0.34	0.30	0.23	0.21	0.18	0.15	0.12	0.05	0	0	0	0	0
0.60	1.00	0.62	0.52	0.45	0.40	0.34	0.29	0.22	0.20	0.18	0.14	0.11	0.05	0	0	0	0	0
0.58	0.99	0.62	0.51	0.44	0.39	0.33	0.29	0.22	0.19	0.17	0.14	0.10	0.04	0	0	0	0	0
0.56	0.98	0.61	0.51	0.44	0.39	0.33	0.28	0.22	0.19	0.17	0.13	0.10	0.03	0	0	0	0	0
0.54	0.97	0.61	0.51	0.43	0.39	0.32	0.28	0.21	0.19	0.16	0.13	0.09	0.03	0	0	0	0	0
0.52	0.96	0.60	0.51	0.43	0.38	0.32	0.27	0.21	0.18	0.16	0.12	0.09	0.02	0	0	0	0	0
0.50	0.95	0.60	0.51	0.43	0.38	0.32	0.27	0.21	0.18	0.16	0.12	0.08	0.02	0	0	0	0	0
0.48	0.94	0.60	0.51	0.43	0.38	0.31	0.27	0.20	0.18	0.15	0.12	0.08	0.01	0	0	0	0	0
0.46	0.93	0.60	0.51	0.43	0.38	0.31	0.27	0.20	0.18	0.15	0.11	0.08	0.01	0	0	0	0	0
0.44	0.92	0.60	0.51	0.43	0.39	0.31	0.27	0.20	0.18	0.15	0.11	0.07	0.01	0	0	0	0	0
0.42	0.91	0.60	0.51	0.44	0.39	0.31	0.27	0.20	0.18	0.15	0.11	0.07	0	0	0	0	0	0
0.40	0.90	0.61	0.52	0.45	0.40	0.32	0.28	0.21	0.18	0.15	0.11	0.07	0	0	0	0	0	0
0.38	0.89	0.61	0.53	0.45	0.41	0.32	0.28	0.21	0.18	0.15	0.11	0.07	0	0	0	0	0	0
0.36	0.88	0.62	0.53	0.46	0.42	0.33	0.29	0.21	0.18	0.15	0.11	0.07	0	0	0	0	0	0
0.34	0.87	0.62	0.54	0.48	0.43	0.34	0.30	0.22	0.19	0.15	0.11	0.07	0	0	0	0	0	0
0.32	0.86	0.63	0.55	0.49	0.45	0.36	0.30	0.22	0.19	0.16	0.12	0.07	0	0	0	0	0	0
0.30	0.85	0.65	0.57	0.51	0.47	0.37	0.32	0.23	0.20	0.16	0.12	0.08	0	0	0	0	0	0
0.28	0.84	0.66	0.58	0.54	0.49	0.39	0.33	0.24	0.21	0.17	0.13	0.08	0	0	0	0	0	0
0.26	0.83	0.68	0.60	0.57	0.51	0.41	0.35	0.26	0.22	0.18	0.14	0.09	0	0	0	0	0	0
0.24	0.82	0.70	0.63	0.60	0.54	0.44	0.37	0.28	0.23	0.20	0.15	0.10	0	0	0	0	0	0
0.22	0.81	0.72	0.66	0.63	0.58	0.47	0.39	0.30	0.25	0.21	0.16	0.11	0	0	0	0	0	0
0.20	0.80	0.74	0.69	0.66	0.61	0.49	0.42	0.32	0.27	0.23	0.18	0.12	0	0	0	0	0	0

Table 3 - Relationship between w/h ratio and the location of e/E points from panel centerline in terms of depth (1)

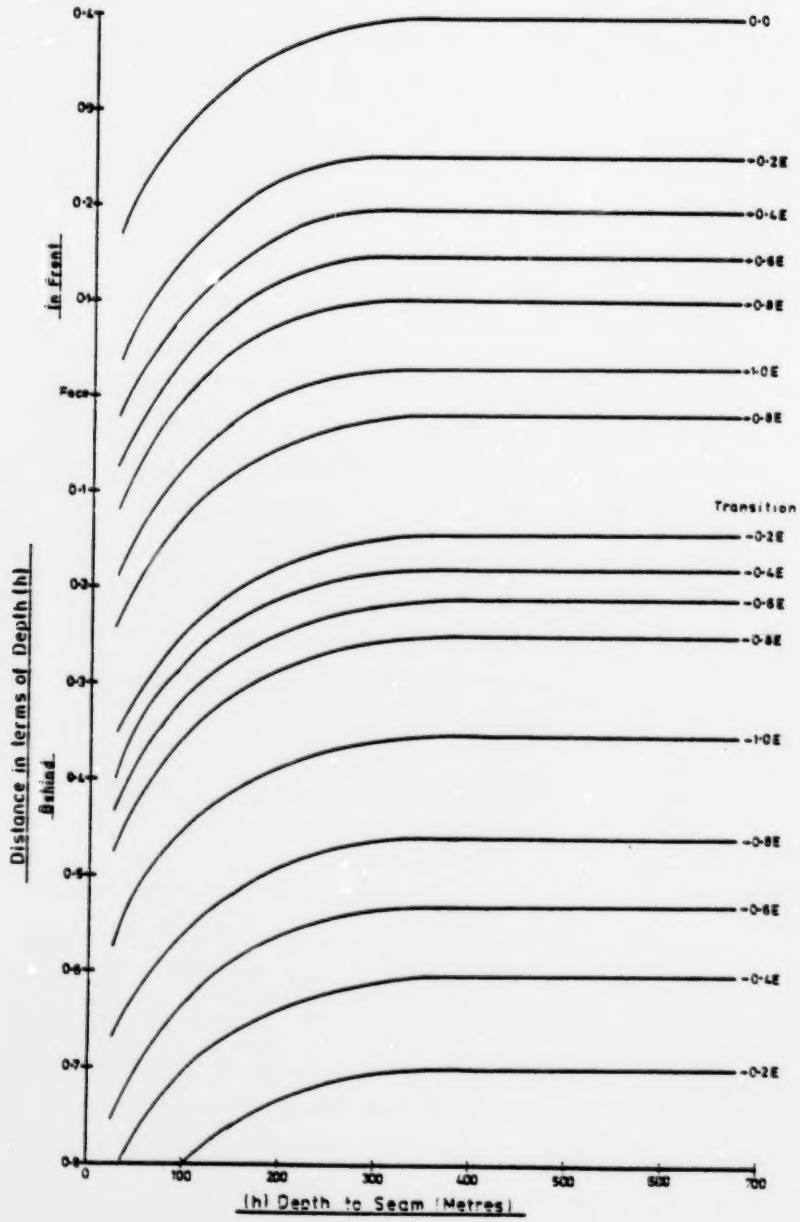

Figure 6 - Graph for the prediction of longitudinal strain contours (6)

are comparable to the coalfields from which the original case histories were collected.

Subsidence profiles for panels with width/depth ratios exceeding 3.0 can be calculated providing the s/S and e/E contours in Figures 2 and 5 are assumed to continue in a linear manner. However, the results should be treated with care, since a preliminary analysis of 15 case histories from the East Midlands Coalfield, w/h ratios between 0.85 and 4.54, revealed that the NCB SEH values were higher than those actually measured in the field (2). The absence of an extensive data base or in-depth research suggests that although the NCB SEH can be used for profiles with w/h ratios exceeding 3.0, the results should only be interpreted as being equivalent to a 'good first order approximation' of the actual subsidence profile.

The longitudinal profile prediction curves given in Figures 3 and 6, were derived from case histories collected in the East Midlands Coalfield and are therefore not necessarily representative of conditions elsewhere. However, until further research is undertaken, it is assumed that provided the conditions to which they are applied are similar to those in the East Midlands Coalfield, the values obtained can be interpreted as being equivalent to a 'good first order approximation' of the actual subsidence profile.

CONCLUSION

Two programs have been developed at the Cape Breton Coal Research Laboratory which allow the computerised calculation of subsidence profiles using the NCB SEH method. These programs allow both transverse and longitudinal subsidence profiles to be calculated for width/depth ratios up to 14.0. However, the NCB SEH only allows profiles with width/depth ratios up to 3.0 and generalised longitudinal profiles to be calculated. It is therefore necessary to indicate to future researchers who use these programs how the width/depth ratios in the range 3.0 to 14.0 were derived and where the predictive methods for the longitudinal profiles originated.

Methods contained in the NCB SEH were extrapolated to calculate subsidence profiles with width/depth ratios in excess of 3.0. The longitudinal profiles are calculated from a series of prediction curves developed for the East Midlands Coalfield in the United Kingdom. In both cases, the

results obtained using these methods should be treated with care and the values interpreted as being equivalent to 'good first order approximations' of the actual subsidence profile.

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